REMARKS

Favorable reconsideration of this application, in light of the preceding amendments and following remarks, is respectfully requested.

Claims 22 and 23 are pending in this application. Claim 22 is amended. No claims are added or cancelled. Claim 22 is the independent claim.

Rejections under 35 U.S.C. § 103

Lee in view of Chang and Seidl

Claim 22 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,844,604 to Lee et al. (hereinafter "*Lee*") in view of U.S. Patent No. 3,996,021 to Chang et al. (hereinafter "*Chang*") and U.S. Publication No. 2002/0014647 to Seidl et al. (hereinafter "*Seidl*"). Applicants respectfully traverse this rejection for the reasons detailed below.

The Examiner alleges that *Lee* teaches a capacitor of a semiconductor device comprising a lower electrode; an AlO(Alx,Oy) film 14 formed on the lower electrode; an upper electrode formed on the AlO film; and a dielectric film 14 having a dielectric constant that is higher than that of the AlO film between the upper electrode and the AlO layer, wherein the dielectric film is an HfO_2 layer, a ZrO_2, or an STO layer, and wherein the dielectric film is directly in contact with the upper electrode (since the first layer is an HfO_2 dielectric film, see column 2, lines 66-67). The Examiner further alleges that *Lee* does not teach using an AHO ((Alx,Hf1-x)Oy) film. *Chang* allegedly teaches using an AHO film instead of AlO film (col. 6, lines 33-50). *Seidl* teaches in figure 1n and related text a capacitor comprising a lower electrode 60, an AHO film 70 formed on the lower electrode, and an upper electrode 80 formed in direct contact with the AHO film. Therefore, the Examiner alleges that it is obvious to a person of ordinary skill in the art at the time the invention was made to replace the AlO film in

Lee's device with an AHO film in order to improve the device characteristics. Applicants respectfully disagree.

Lee does not teach or suggest "the dielectric film is an HfO_2 layer, a ZrO_2 layer, or an STO layer, and wherein the dielectric film is directly in contact with the upper electrode" as recited in independent claim 22. Referring to Col. 2, lines 66-67, *Lee* discloses that a first layer is HfO_2, ZrO_2, Ta_2O_3 or Y_2O_3 and a second layer is Al_2O_3. Referring to Fig. 1B in *Lee*, the first layer is indicated by reference number 18 and the second layer is indicated by reference number 20. As shown in Fig. 1B, the first and second layers 18 and 20 are sequentially stacked. Accordingly, the uppermost layer is the second layer 20, which is an AlO layer. Because an upper electrode would be formed on the second layer 20, Applicants submit that the upper electrode is always in contact with the second layer 20 or the AlO layer, rather than the dielectric film as recited in claim 22 and as agreed to by the Examiner in the Interview conducted on August 17, 2009.

In addition, the first layer 18 of *Lee* is not an AHO film, but rather the first layer 18 is made of only HfO_2, ZrO_2, Ta_2O_3 or Y_2O_3, and therefore, does not disclose the AHO film of claim 22.

Furthermore, the Examiner alleges *Lee*'s AlO layer, that is, the second layer 18, can be replaced with an AHO film as disclosed in *Chang*. Applicants respectfully disagree. Specifically, Applicants submit that *Chang* discloses a combination of Al and HfO. However, the combination of Al and HfO disclosed in *Chang* is used to coat the outside surface of a metal article in order to improve resistance to high temperature environments (see abstract, col. 6, lines 41-44). *Chang* does not disclose using the combination of Al and HfO as a dielectric layer of a capacitor as in claim 22.

Therefore, if *Chang*'s Al and HfO layer is applied to *Lee*, *Chang*'s layer would be only used to coat the surface of an article disclosed in *Lee*, not used to replace the

second layer 20 on which an upper electrode would be formed because *Lee*'s first layer 18 is not the surface of the article disclosed in *Lee*. According to the Examiner's interpretation, an upper electrode would be formed on the second layer 20 of *Lee*, such that the surface of an article disclosed in *Lee* would be the surface of the upper electrode. Accordingly, Applicants submit that one skilled in the art would not be motivated to replace the second layer 20 of *Lee* with the layer disclosed in *Chang* in order to render obvious claim 22.

Finally, the Examiner alleges that an element indicated by reference number 14 in *Lee* indicates both an AlO film formed on a lower electrode and a dielectric film between the upper electrode and the AlO film. However, the Examiner's allegation is incorrect because one element can't indicate two different elements as recited in claim 22.

In view of the above, Applicants respectfully submit that *Lee*, *Chang* and *Seidl*, whether alone or in combination, fail to teach or suggest each and every element of claim 22, and therefore, cannot render claim 22 obvious.

The Applicants, therefore, respectfully request that the rejection to Claim 22 under 35 U.S.C. § 103(a) be withdrawn.

Yeo in view of Chang and Seidl

Claim 22 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,936,881 to Yeo et al. (hereinafter "Yeo") in view of Chang and Seidl. Applicants respectfully traverse this rejection for the reasons detailed below.

Applicants submit herewith a certified English translation of the foreign priority application KR 10-2003-0015197, filed on March 11, 2003. As Yeo was filed on July 25, 2003, the enclosed certified English translation of KR 10-2003-0015197 disqualifies Yeo as prior art under any section of 35 U.S.C. 102 including 102(e).

The Applicants, therefore, respectfully request that the rejection to Claims 22 under 35 U.S.C. § 103(a) be withdrawn.

Conley Jr. in view of Chang and Seidl

Claim 23 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,930,059 to Conley, Jr., et al. in view of Chang and Seidl. Applicants respectfully traverse this rejection for the reasons detailed below.

The Examiner alleges that *Conley* discloses a capacitor of a semiconductor device comprising a lower electrode; an AlO(Alx,Oy) film 144 formed on the lower electrode; an upper electrode formed on the AlO film; and a dielectric film 143 having a dielectric constant that is higher than that of the AlO film between the upper electrode and the AlO layer, wherein the dielectric film is an HfO_2 layer, a ZrO_2, or an STO layer, and wherein the dielectric film is directly in contact with one electrode. The Examiner further alleges that *Conley* does not teach using an AHO((Alx,Hf1-x)Oy) film, and does not explicitly state that the dielectric film is directly in contact with the upper electrode. *Chang* teaches using an AHO film instead of AlO film (col. 6, lines 33-50). *Seidl* teaches in figure 1 and related text a capacitor comprising a lower electrode, an AHO film formed on the lower electrode, and an upper electrode formed in direct contact with the AHO film. Therefore, it is allegedly obvious to a person of ordinary skill in the art at the time the invention was made to replace the AlO film in *Conley*'s device with an AHO film and to form the dielectric film in direct contact with the upper electrode, in order to improve the device characteristics and in order to use the capacitor in an application which requires specific electrode positioning, respectively. Applicants respectfully disagree.

Conley discloses a dielectric layer structure which is formed by alternatively depositing hafnium oxides 143 and 143' and aluminum oxides 144 and 144' on an

active area of a substrate 141. The Examiner alleges that in the dielectric layer structure it is possible to replace the aluminum oxides 144 and 144' with *Chang*'s AHO film. However, as described above, *Chang*'s AHO film is used to coat the surface of a metal article. Therefore, if *Chang*'s AHO film is applied to *Conley*'s device, Applicants submit that *Chang*'s AHO film would be used only to coat an article disclosed in *Conley*, and *Conley* does not disclose a metal article. *Chang* does not disclose another use except coating the surface of a metal article using the AHO film. In particular, *Chang* does not disclose that the AHO film should be used as a dielectric film of a capacitor as recited in claim 22. Therefore, Applicants respectfully submit that it is not obvious to a person of ordinary skill in the art to replace *Conley*'s aluminum oxides 144 and 144' with *Chang*'s AHO film that is used to coat the surface of a metal article in order to render obvious claim 22.

In addition, the uppermost layer of the dielectric layer structure disclosed in *Conley* is an AlO film. Accordingly, even if it were possible to replace *Conley*'s aluminum oxides 144 and 144' with *Chang*'s AHO film (which Applicants do not admit), the AHO film would be in contact with an upper electrode formed on the dielectric layer structure. Therefore, the combination of *Chang* and *Conley* fails to disclose a dielectric film between an AHO film and an upper electrode and in direct contact with the upper electrode as recited in claim 22.

In view of the above, Applicants respectfully submit that *Conley*, *Chang* and *Seidl*, whether alone or in combination, fail to teach or suggest each and every element of claim 22, and therefore, cannot render claim 22 obvious.

The Applicants, therefore, respectfully request that the rejection to Claim 23 under 35 U.S.C. § 103(a) be withdrawn.

Lee, Yeo or Conley in view of Chang and Seidl and Chooi

Claim 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over (*Lee*, *Yeo* or *Conley Jr.*) each in view of *Chang* and *Seidl* and further in view of *Chooi*. Applicants respectfully traverse this rejection for the reasons detailed below.

The Examiner alleges that *Lee*, *Yeo* or *Conley* and *Chang* and *Seidl* teach substantially the entire claimed structure, as applied to claim 22 above, except an oxidation barrier film formed between the lower electrode and the AHO layer. However, *Chooi* allegedly teaches an oxidation barrier film formed between the lower electrode and the AHO layer (col. 2, lines 16-20).

Even assuming *arguendo* that these references could be combined (which Applicants do not admit), the Examiner has failed to show how these references remedy the deficiencies of each of *Lee*, *Yeo*, *Conley Jr.*, *Chang* and *Seidl* with respect to independent claim 22. Thus, claim 23 is patentable over these combined references for the reasons set forth above with respect to independent claim 1.

The Applicants, therefore, respectfully request that the rejection to Claim 23 under 35 U.S.C. § 103(a) be withdrawn.

CONCLUSION

In view of the above remarks and amendments, the Applicants respectfully submit that each of the pending objections and rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) hereby petition(s) for a three (3) month extension of time for filing a reply to the outstanding Office Action and submit the required $1110.00 extension fee herewith.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Erin G. Hoffman, Reg. No. 57,752, at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By _____

John A. Castellano, Reg. No. 35,094
P.O. Box 8910
Reston, Virginia 20195
(703) 668-8000

JAC/EGH:ljs

CERTIFICATION OF TRANSLATION

I, ***Jung-kum Lee***, an employee of Y.P.LEE, MOCK & PARTNERS of Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of ***Korean Patent Application No. 10-2003-0015197*** consisting of *30* pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 26th day of December 2009

Jungkum Lee